

REMARKS

Claims 1-16 remain in the instant application. No new matter has been added.

Claims 1-16 were rejected under the first paragraph of 35 U.S.C. §112 as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to make and/or use the invention. It is alleged that one having ordinary skill in the art would be required to perform undue experimentation to identify how to polymerize monomers taught in the claimed process when the cited Riccardo Po, et al. reference fails to polymerize styrene using the same catalyst system. Applicants respectfully disagree with this rejection. The reason that applicants' method is successful is because the present invention teaches an oligomerization reaction, while Po, et al. discloses a polymerization reaction. Moreover, Po, et al. discloses polymerizing styrene using the cited catalyst system, while applicants teach oligomerizing simple olefins, such as ethylene, propylene and butenes. The instant invention is not analogous because applicants teach a wholly different reaction. One skilled in the art would recognize that a polymerization reaction is not necessarily analogous to an oligomerization reaction. One skilled in the art would also recognize that styrene possesses chemical reactivity that is vastly different from that of simple olefins. Hence, all of these factors contribute to the success of applicants' claimed invention, whereas Po, et al. discloses a process that was unsuccessful. Applicants merely cited the Po, et al. reference to note that the  $\text{Ni}(\text{Ph}_2\text{C}_2\text{S}_2)_2$  catalyst has been used before unsuccessfully for polymerization reactions.

Claims 1-16 were rejected under the second paragraph of 35 U.S.C. §112 as being indefinite for failing to particularly point and distinctly claim the subject matter which applicants regard as the invention. In particular, claims 1 and 16 are alleged to be unclear as to whether the olefinic monomer would be reacted to produce any polymers during the contact step. Applicants contend that it is clear from claims 1 and

16 and the Examples that only oligomers are formed by the instant invention. Any polymer formation would result in compounds having at least 1,000 carbon atoms, which was not disclosed or taught in the instant case. Paragraph [0013] on pages 5-6 of the instant application discloses a definition for "oligomers" that should be familiar to one skilled in the art.

Claims 3 and 15 were alleged to be indefinite because of the phrase "and derivatives thereof." The cited phrase has been deleted from amended claims 3 and 15.

Claim 15 and paragraph [0027] on page 10 of the specification were also amended to correct a typographical error in the spelling of "thiophenes."

The phrase "alkylating agents" in claim 4 was alleged to be indefinite because the Examiner understands the claimed invention to be a polymerization process and not an alkylating process. Applicants kindly note that the invention is not directed to a polymerization process. The present claims teach an oligomerization process. The "alkylating agent" is an integral component of the catalyst system and acts as a cocatalyst. Paragraph [0022] on page 9 of the present specification lists two sample alkylating agents to be methyl magnesium chloride and methyl lithium. Claim 4 has been amended to incorporate those two sample alkylating agents.

Based on the above responses and amendments, applicants respectfully request that the rejections under the first and second paragraphs of 35 U.S.C. §112 be removed.

Claims 1-5 and 7 were rejected under 35 U.S.C. §102(b) as being anticipated by the Riccardo Po, et al. reference. It is alleged that the Po, et al. reference anticipates the instant claims because Po, et al. discloses a contacting step of styrene with a catalyst substantially the same as claimed in the present case. For the reasons that follow, applicants respectfully disagree with this rejection.

The Po, et al. reference discloses polymerization of styrene. When the catalyst  $\text{Ni}(\text{Ph}_2\text{C}_2\text{S}_2)_2$  (labeled PS8b) was used in Po, et al.'s polymerization reaction, the yield was zero (see Table 1 of Po, et al.). Conversely, applicant's claimed invention produces different results because it is for an oligomerization reaction and because the reactivity (or lack thereof) of styrene does not translate to the reactivity of simple olefins taught in the instant case. To further distinguish claims 1-5 and 7 from Po, et al., applicants have amended claim 1 to be a method for "producing oligomers having less than 40 carbon atoms using at least one aliphatic olefinic monomer." Support for this amendment is found in paragraph [0013] on page 6 and paragraph [0026] on page 10 where all of the exemplified monomers are aliphatic monomers. This amendment and the stated arguments should obviate the rejection under 35 U.S.C. §102(b) of claims 1-5 and 7.

Claims 1-4, 9 and 10 were rejected under 35 U.S.C. §102(b) as being anticipated by the English abstract of Japanese patent 70007522B. The Examiner alleges that the abstract discloses a step of contacting ethylene in the presence of a catalyst substantially the same as applicant's claimed process. The applicants respectfully disagree with this rejection.

Attached herewith, applicants have provided a copy of a full English translation of the Japanese patent. The disclosure of the Japanese patent clearly does not anticipate the claimed invention. First, the Japanese patent discloses the co-oligomerization of ethylene and butadiene. Second, no ethylene oligomers are formed in the Japanese patent. In the instant case, applicants have amended claim 1 such that an "olefinic monomer having one carbon-carbon double bond" is used to produce the oligomers. Support for this amendment is found throughout the Examples and the specification of the instant application. This amendment clearly distinguishes the claimed invention from the disclosure of the Japanese patent in that butadiene is excluded from the realm of possible olefinic monomers. Hence, the rejection of claims 1-4, 9 and 10 under 35 U.S.C. §102(b) should be properly removed.

Claims 6 and 8 were rejected under 35 U.S.C. §103(a) as being unpatentable over the Po, et al. reference. It is alleged that it would have been obvious to one having ordinary skill in the art to have modified the process of Po, et al. by selecting an appropriate pressure to optimize the contacting step under gas phase, since it is expected that under any pressure in any phase the Po, et al. process yields similar results. Applicants respectfully submit that the Examiner has improperly applied the process of Po, et al. to the present claims 6 and 8. The Po, et al. reference discloses using liquid/solution monomers in running its styrene polymerization reactions. Hence, there are no pressure measurements disclosed in Po, et al., as correctly noted by the Examiner. However, claims 6 and 8 of the instant application teach pressure ranges and gas phase reaction conditions, respectively, that are wholly unrelated to the Po, et al. disclosure. As a result, the Examiner is incorrect in stating that "it is expected that under any pressure in any phase, the Riccardo process yields similar results." Thus, this rejection of claims 6 and 8 should be removed because the disclosure of Po, et al does not render the cited claims obvious to one skilled in the art.

Claims 6 and 8 were also rejected under 35 U.S.C. §103(a) as being unpatentable over the Japanese patent cited hereinabove. The Examiner alleges that it would have been obvious to one skilled in the art to have modified the Japanese process, which does not disclose the condition of the contacting step, by selecting an appropriate temperature and pressure such as applicants' claimed ones under the gas phase, since it is expected that under any condition the Japanese process yields similar results. Applicants re-assert their arguments made against the Japanese patent discussed above. One skilled in the art would realize that running the co-oligomerization reaction of the Japanese patent under the conditions specified in instant claims 6 and 8 would still yield a different process, especially in light of the amendments made to claim 1. Therefore, this rejection of claims 6 and 8 under 35 U.S.C. §103(a) should be removed.

Claims 11 and 12 were rejected under 35 U.S.C. §103(a) as being unpatentable over the Japanese patent referenced above in view of Masters, et al. (U.S. Patent No. 4,533,651). The Examiner asserts that it would have been obvious to one skilled in the art to have modified the Japanese process by using the silica as support to enhance the performance of the Japanese catalyst, since Masters, et al. discloses that silica support also functions as a cocatalyst. Applicants reiterate their arguments against the Japanese patent and further state that combining the Japanese patent with the Masters, et al. patent does not result in the teachings of instant claims 11 and 12. Combining the cited references would, instead, result in using a silica support for the co-oligomerization of ethylene and butadiene, which is a completely different process that taught in claims 11 and 12 of the present case. Applicants contend that the support of claims 11 and 12 have not been used with the method taught in claim 1 in the relevant art. Thus, this rejection should be kindly removed.

Lastly, claims 13-16 were rejected under 35 U.S.C. §103(a) as being unpatentable over the cited Japanese patent in view of Wang, et al. (U.S. Patent No. 6,120,692). It is alleged by the Examiner that it would be obvious to one skilled in the art to have modified the disclosure of the Japanese process by using olefin feeds containing impurities, such as the sulfur contaminants disclosed in Wang, et al., because it is expected that any olefin feed can be used to contact the catalyst disclosed in the Japanese patent. Applicants respectfully disagree with this rejection and reiterate their arguments against applying the Japanese patent in rejecting claims 13-16. The Wang, et al. patent actually teaches away from instant claims 13-16, because Wang, et al. discloses in the abstract thereof that the transition metal dithiolene complexes are "useful for selective removal and recovery of olefins from process streams containing contaminants such as CO and H<sub>2</sub>S." Claims 13-16 of the instant application does not involve any selective removal and recovery of olefins from contaminated olefin streams. Instead, the contaminants taught in claims 13-16 are incorporated into the feed

and used in the oligomerization reaction, thereby displaying the advantage taught in claims 13-16 over the disclosure of Wang, et al. Thus, combining the disclosure of Wang, et al. with the Japanese patent would not arrive at the teachings of instant claims 13-16. Furthermore, one skilled in the art would not be motivated to combine the two cited references to arrive at the teachings of claims 13-16. Hence, the rejection of instant claims 13-16 under 35 U.S.C. §103(a) should be properly removed.

In view of the foregoing comments and amendments, applicants kindly request reconsideration of the application. Applicants believe the case is now in condition for allowance and respectfully request the Examiner to pass the case to issue at an early date.

Respectfully submitted,



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☒ Pursuant to 37 CFR 1.34(a)

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